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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,487	10/27/2003	Hideki Komatsuda	105193.07	3126

25944 7590 05/31/2005

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EXAMINER

FULLER, RODNEY EVAN

ART UNIT PAPER NUMBER

2851

DATE MAILED: 05/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

8m

Office Action Summary

Application No.

10/693,487

Applicant(s)

KOMATSUDA, HIDEKI

Examiner

Rodney E. Fuller

Art Unit

2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2005.
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 56-94 and 96 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 56-94 and 96 is/are rejected.
7) ☒ Claim(s) 79 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 27 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/259,137.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

RODNEY FULLER
PRIMARY EXAMINER

R. Fuller

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 26, 2005 has been entered.

Remarks

2. In response to applicant's Amendment, dated January 26, 2005, the examiner acknowledges the cancellation of claim 95. Claims 56-94 and 96 are pending.

3. The applicant notes (page 9 of Amendment) that the limitation "whereby said optical element images said secondary light source in an exit pupil of the illumination system" is not present in claim 96. The examiner agrees with the applicant. However, claim 96 includes the "equivalent" limitation of "wherein the secondary light source is formed at an exit pupil of the illumination system."

4. Regarding the limitation of claim 56 of "wherein said optical element images said secondary light source in an exit pupil of the illumination system," the applicant makes the following arguments:

"Referring to page 23, lines 21-33 and Fig. 20, it is clear that the second reflecting group 220b is positioned in an optically conjugate position with respect to an entrance pupil of the projection optical system. In particular, the second

reflecting group 220b is positioned at an exit pupil of the illumination optical system (which is optically conjugate with respect to an entrance pupil of the projection optical system). Thus, mirror 66 (which corresponds to the claimed 'optical element' images (i.e., forms an image of) the secondary light source (which is formed at secondary reflecting element group 22b) in an exit pupil of the illumination system."

The examiner agrees with the applicant's assertion that the "second reflecting group 220b is positioned in an optically conjugate position with respect to an entrance pupil of the projection optical system. However, the specification (including the cited passages) do not support the allegation that "the second reflecting group 220b is positioned at an exit pupil of the illumination optical system." Furthermore, the limitation can be read the optical element images the secondary light sources "onto" the exit pupil of the illumination system. In this interpretation, the applicant's arguments would mean that the optical element images the secondary light sources plane onto itself. Thus, the examiner has considered the applicant's arguments and maintains that the specification does not support the limitation of "wherein said optical element images said secondary light source in an exit pupil of the illumination system."

5. Regarding the limitation of claim 56 of "said raster element of said mirror or lens is shaped and arranged in such a way that an image of said raster element covers a major portion of said reticle plane," the applicant makes the following arguments:

"With reference to Fig. 20, the light beam from the first reflecting element Ea1 forms an arc-shaped irradiation region on a mask M. Although not depicted

in Fig. 20, the light beam from the first reflecting element Eb1 also forms an arc-shaped irradiation region in the same region of the mask where first reflecting element Ea1 forms an arc-shaped irradiation region. This is supported, for example, at page 23, lines 14-16, which describes that 'the light from the plurality of light source images I... arcuately illuminate mask M in a superimposed manner.' Thus, since the light from each of the raster elements are superimposed with each other, the light from each of the raster elements covers a major portion of the reticle plane."

The examiner agrees with applicant's assertion that the light from each of the raster elements are superimposed with each other. However, the examiner disagrees that this in turn means that the light from each of the raster elements covers a major portion of the reticle plane. The specification (including the cited passages) do not support the allegation the image of the raster elements covers a major portion of the reticle plane. Figure 20 shows relationship of the image to the overall size of the reticle. Further, in Figures 4, 13, 21, 25, 26, 28, 31 and 32 it appears that only a "small" portion of the reticle is illuminated and the reticle is scanned. Thus, the examiner has considered the applicant's arguments and maintains that the specification does not support the limitation of "said raster element of said mirror or lens is shaped and arranged in such a way that an image of said raster element covers a major portion of said reticle plane."

6. Regarding the limitation of claim 56 of "said pupil is defined by an aperture and a filling ratio," the applicant makes the following arguments:

“...as described on page 23, lines 29-30, in the illumination device of the second embodiment, Kohler illumination conditions are satisfied (i.e., the condenser optical system 64 forms an image of the secondary light source so that an image position of the secondary light source is infinitely far with respect to the mask surface). In the case of Kohler illumination, the aperture of the light beam with respect to the mask is determined by the size of the entire secondary light source. The ratio of the light source image occupied by the entire secondary light source is the filling ratio. Thus, the pupil is defined by an aperture and a filling ratio.”

The examiner agrees with applicant's assertion Kohler illumination conditions are satisfied. However, the examiner disagrees with applicant's assertions related to Kohler illumination conditions. Page 13, lines 20-22 of the specification states “Uniform Kohler illumination is achieved when each light source image I formed by each reflecting element E is re-imaged at pupil position P of projection optical system 76.” There is no support for the assertion that Kohler illumination would mean that “the condenser optical system 64 forms an image of the secondary light source so that an image position of the secondary light source is infinitely far with respect to the mask surface.” Further, there is no support for the assertion that the ratio of the light source image occupied by the entire secondary light source is the filling ratio. Thus, the examiner has considered the applicant's arguments and maintains that the specification does not support the limitation of “said pupil is defined by an aperture and a filling ratio.”

7. Regarding the limitation of claim 64 of “a second mirror or lens with multiple number of pupil honeycombs,” the applicant make the following arguments:

“The limitation is supported “by the second reflecting element group 220b, which has a plurality of pupil honeycombs (each element of group 220b is a honeycomb, and the element is located at a pupil of the system).”

Although the specification never describes or suggest the term “pupil honeycombs”, the examiner concedes that the element 220b may be considered to be a plurality of “pupil honeycombs”.

8. Regarding the limitation of claim 66 of “wherein said pupil honeycombs are arranged on said second mirror or lens in such a way that their images... illuminate said exit pupil with a predetermined pattern,” the applicant makes the following argument:

“...the images of the elements of second reflecting group 220b illuminate the exit pupil in a superimposed manner so as to form, for example, an arcuate shape, which is a “predetermined pattern.”

The examiner notes that the specification (see abstract) indicates that an illumination field (IF), at the mask, may have an arcuate shape. However, there is no support for the assertion that an exit pupil is illuminated so as to form an arcuate shape. Thus, the examiner has considered the applicant’s arguments and maintains that the specification does not support the limitation of “wherein said pupil honeycombs are arranged on said second mirror or lens in such a way that their images... illuminate said exit pupil with a predetermined pattern.”

9. Regarding the limitation of claim 75 of “wherein said raster scan element of said mirror is tilted relative to an enveloping or bearing surface,” the applicant makes the following argument:

“...this section (page 44, lines 1-15) of the specification describes that the second reflecting element group is arranged on a spherical surface, which corresponds to the claimed “enveloping or bearing surface.”

The examiner notes that specification does not support the allegation that a spherical surface corresponds to an “enveloping or bearing surface.” Thus, the examiner has considered the applicant’s arguments and maintains that the specification does not support the limitation of “wherein said raster scan element of said mirror is tilted relative to an enveloping or bearing surface.”

10. Regarding the limitation of claim 77 of “wherein said mirror device has an outer axial course of light bundle that is free of vignetting,” the applicant makes the following argument:

“... in Fig. 9, which shows that light bundles 110a, 110c are not shielded by mirrors 60, 66. That is, the light bundles 110a, 110c are not vignetted.”

The term vignetting generally refers to a decrease in the brightness of an image toward the edge of the image due to physical causes. Hence, the fact that light bundles are not shielded by mirrors 60, 66 does not necessarily mean that “an outer axial course of light bundle that is free of vignetting.” Thus, the examiner has considered the applicant’s arguments and maintains that the specification does not support the

limitation of "wherein said mirror device has an outer axial course of light bundle that is free of vignetting."

11. Regarding the limitation of claim 79 of "an optical element that has a function selected from the group consisting of imaging a secondary light source in an entrance pupil of a subsequent projection objective, remodeling a pre-given rectangular illumination by raster elements to form a field in a form of an annular segment, adjusting an intensity distribution over said field, and mixtures thereof," the applicant make the following arguments:

"... 'imaging a secondary light source in an entrance pupil of a subsequent projection objective' is described, for example, at page 23, lines 21-23 and in Fig. 20, which makes it clear that the second reflecting element group 220b is positioned at an optically conjugate position with respect to an entrance pupil of the projection optical system, and that a light source image (i.e., secondary light source image) is formed at this position. The claim 79 feature of 'adjusting an intensity distribution over said field' is described, for example, at page 42, lines 9-15."

The examiner acknowledges the support for the limitation of "imaging a secondary light source in an entrance pupil of a subsequent projection objective." The examiner notes that applicant canceled the limitation of "remodeling a pre-given rectangular illumination by raster elements to form a field in a form of an annular segment." The specification at page 42, lines 9-15 is directed toward adjusting a bias in an intensity distribution at the illumination field IF or image field IF'. However, with the

deletion of the above noted limitation there is no longer antecedent support for the term "said field." Thus, the examiner maintains the rejection.

12. Regarding the limitation of claim 80 of "an accessible diaphragm plane," the applicant makes the following argument:

"The feature of an 'accessible diaphragm plane' of claim 80 is described, for example, at page 33, lines 21-28, which discloses a plurality of exchangeable diaphragms. An "accessible diaphragm plane" means that the diaphragm plane can be accessed so that one diaphragm can be exchanged for another."

Although the specification never describes or suggest the term "accessible diaphragm plane", the examiner concedes that the apertures described at page 33, lines 21-28 could be considered to be at an accessible diaphragm plane.

13. Regarding the limitations of claim 87 of "arranging said raster element of second mirror or lens to a position at said secondary light source;" "shaping said raster element of said second mirror or lens such that its form corresponds to that of said secondary light source;" "said raster element of said first mirror or lens is imaged in said reticule plane by said raster element of second mirror or lens;" and "said secondary light source is imaged in an exit pupil of said optical element," the applicant refers to the "discussion regarding claim 56." Thus, as with claim 56, the examiner maintains that the above limitations are not disclosed.

Claim Rejections - 35 USC § 112

14. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

15. Claims 56-94 and 96 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claims 56, after review of the cited sections, the examiner maintains that the claimed limitation of "whereby said optical element images said secondary light source in an exit pupil of the illumination system" is not disclosed. Likewise, the limitation of claim 96 of "wherein the secondary light source is formed at an exit pupil of the illumination system" is not disclosed.

Regarding claim 56, after review of the cited sections, the examiner maintains that the claimed limitation of "said raster element of said mirror or lens is shaped and arranged in such a way that an image of said raster element covers a major portion of said reticle plane" is not disclosed. (Emphasis added)

Regarding claim 56, after review of the cited sections, the examiner maintains that the claimed limitation of "said pupil is defined by an aperture and a filling ratio" is not disclosed.

Regarding claim 66, after review of the cited sections, the examiner maintains that the claimed limitation of "wherein said pupil honeycombs are arranged on said second mirror or lens in such a way that their images... illuminate said exit pupil with a predetermined pattern" is not disclosed.

Regarding claim 75, after review of the cited sections, the examiner maintains that the claimed limitation of “wherein said raster element of said mirror is tilted relative to an enveloping or bearing surface” is not disclosed. (Emphasis added)

Regarding claim 77, after review of the cited sections, the examiner maintains that the claimed limitation of “wherein said mirror device has an outer axial course of a light bundle that is free of vignetting” is not disclosed.

Regarding claim 79, after review of the cited sections, the examiner maintains that the claimed limitation of “adjusting an intensity distribution over said field, and mixtures thereof” is not disclosed.

Regarding claim 87, after review of the cited sections, the examiner maintains that the claimed limitations of “arranging said raster element of second mirror or lens to a position at said secondary light source;” “shaping said raster element of said second mirror or lens such that its form corresponds to that of said secondary light source;” “said raster element of said first mirror or lens is imaged in said reticule plane by said raster element of second mirror or lens;” and “said secondary light source is imaged in an exit pupil of said optical element” are not disclosed.

Claims 57-86 and 88-94 depend from claim 56 and therefore include the deficiencies of claim 56.

Claim Objections

16. Claim 79 is objected to because of the following item:

Claim 79 recites the limitation "said field" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Conclusion

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney E. Fuller whose telephone number is 571-272-2118. The examiner can normally be reached on 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on 571-272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

May 25, 2005

Rodney E Fuller
Primary Examiner
Art Unit 2851





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Patent Application Publication May 13, 2004 Sheet 10 of 23 US 2004/0090609 A1

